

bacteria the ability to use specific substrates (e.g. citrate), resistance to toxic metal ions or the property of virulence. Their placement in a separate section could be regarded as somewhat arbitrary, particularly in relation to considering the mechanisms of uptake; inevitably this has created some overlaps – for example, citrate uptake is covered in more detail in the second section. Conversely, the uptake of iron is given unjustifiably little attention and is not mentioned at all in the earlier chapter on divalent metal ion transport systems.

Overall this book provides a highly authoritative 'state of the art' account of ion transport systems in prokaryotes. The text is well written with commendably few errors, and is relatively up to date, most chapters being referenced to 1986 (publication data: 1987). At a price of \$85 there will be few personal purchasers, but this book should find a wide market in libraries as well as in laboratories specializing in aspects of membrane research.

N.J. Russell

## *The Nitrogen and Sulphur Cycles*

### The Society for General Microbiology Symposium 42

Edited by J.A. Cole and S.J. Ferguson

*Cambridge University Press; Cambridge, 1988*

xii + 490 pages. £45.00, \$85.00

In January 1988 the Society for General Microbiology held a symposium on 'The Nitrogen and Sulphur Cycles' to honour John Postgate, who had recently retired as Director of the AFRC Unit of Nitrogen Fixation at the University of Sussex. Postgate's seminal contributions to both sulphate reduction and dinitrogen fixation, and his recent demonstration that the sulphate-reducing bacteria *Desulfovibrio* can fix dinitrogen, made the topics of this symposium both apposite and felicitous. The present book derives from the meeting, contains sixteen articles by researchers who have made notable contributions, and represents a splendid survey of the current status in these fields of endeavour. In the space available it is not possible to review the contributions individually and a summary with an overall assessment must suffice.

The book divides naturally into papers relating to sulphur metabolism on the one hand, and to nitrogen metabolism on the other, while S.J. Ferguson straddles the border with an admirable opening discussion of the redox reactions and energetics of both the nitrogen and sulphur cycles,

and John Postgate and his colleagues conclude with their work on dinitrogen fixation by *Desulfovibrio*.

The ecology of the sulphur cycle with respect to oxidative pathways in sediments is considered by B.B. Jørgensen, D.P. Kelly covers a broad canvas with a survey of the oxidation of sulphur compounds, and H.D. Peck and T. Lissolo concentrate on the enzymology and energetics of assimilatory and dissimilatory sulphate reduction, with PAPS, APS and hydrogen cycling pathways. A. Kröger et al. consider sulphur and sulphate as terminal electron acceptors in acetate oxidation, and G. Vooroudouw examines the molecular biology of hydrogenase, cytochrome  $c_3$  and other redox proteins involved in sulphate reduction.

The nitrogen cycle papers commence with a discussion of the ecology of nitrification and denitrification by J.G. Kuenen and L.A. Robertson and follow with details of free radical and monooxygenase mechanisms for biological ammonia oxidation (P.M. Wood) and biochemical and physiological aspects of denitrification (Zumft et al.). J.A. Cole surveys the assimilatory and

dissimilatory reduction of nitrate to ammonia and then, with the exception of an analysis of the symbiotic genes of *Rhizobium* (Johnston et al.), the remainder of the book is devoted to contributions by Postgate's colleagues at Sussex: M.J. Merrick discusses the regulation of nitrogen assimilation by bacteria; R.R. Eady et al. consider alternative and conventional nitrogenases; M.G. Yates, the role of oxygen and hydrogen in nitrogen fixation; and R. Dixon, genetic regulation of nitrogen fixation. Reading these last four articles together serves to re-emphasize the breadth and importance of the researches carried out in the Sussex Unit.

In summary, it is an enjoyable, very readable book, even though not all of the contributors

aspire to the fluency of Postgate, who also provides a charming postscript. Here, then, is a valuable addition to the literature of microbial biochemistry and one which final year undergraduates as well as research workers should find useful as a source of specialist knowledge.

Physically the book is produced to the customary high standards of the Cambridge University Press and it is a celebratory volume of which John Postgate can be proud. However, I do have one gripe – it would have been nice to read on the title page that the symposium on which the book is based was dedicated to John.

E.A. Dawes

## *Sulfur and Sulfur Amino Acids*

### Methods in Enzymology, Volume 143

Edited by W.B. Jakoby and O.W. Griffith

*Academic Press; Orlando, FL, 1987*

582 pages. \$65.00

This is an excellent book, one which maintains the traditional high quality of the series. Although the title suggests otherwise, there is a fair number of chapters on selenium also.

The book is divided into three major sections: Separation and Analysis, Preparative Methods and Enzymes. Each of these sections is further subdivided as appropriate. At key points within the more metabolic aspects useful short reviews are introduced, i.e. inorganic sulphur (J.A. Schiff and T. Saidha) and sulphur amino acid metabolism in mammals (O.W. Griffith), plants (J. Giovanelli) and microbes (K. Soda).

The analytical section is devoted to inorganic sulphur and selenium compounds, thiols and miscellaneous organic compounds. As befits the chemistry of this diverse group of substances, there are many specific assays described, but also several HPLC assays in evidence.

The chapters on preparative methods cover a

miscellaneous group of sulphur and selenium compounds and include some especially useful radioactive synthesis. Three chapters on nutritional methods, including a major review of cysteine metabolism by M.E. Anderson and A. Meister, concludes this section.

Much valuable information (in addition to the reviews mentioned above) is contained within the enzymology section, encompassing as it does details of the enzymology associated with specific amino acids in mammalian, plant and microbial systems. A concluding section deals with a few enzymes that are active in forming disulphides.

For the more general reader, the short reviews constitute a useful means of keeping up to date with this subject. For the specialist the work is essential reading and is therefore strongly recommended.

P.B. Nunn